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MORE ABOUT THE SEA-HORSE.

BY SAMUEL LOCKWOOD.

THE July number of the AMERICAN NATURALIST for 1867 contains my article, "The Sea-Horse and its Young." Although the result of a long study of living specimens of this eccentric fish, yet some questions remained unanswered. At the time mentioned I was living at Keyport, on Raritan Bay. Early in 1870 my residence was changed to Freehold, fourteen miles inland, hence it has happened that specimens sent me have succumbed before reaching my home. A happy exception occurred November 1, 1884, in the arrival from Shark River of a fine large female *Hippocampus heptagonus* Rafin. As the subject of my article in 1867 was a male, I prized my new pet highly.

With an aquarium devoted entirely to this specimen, I set about studying her peculiarities. She had the same habit of converting her tail into a prehensile organ, and so would coil the tip around a tuft of sea-lettuce, and with the pretty dorsal fin in movement like an undulating ribbon, would sway to and fro, keeping the body erect. The sight of the sea-horse alive in the water is always pretty, although quite grotesque, for its action differs so greatly from that of other fishes, which are prone, and usually move in a line parallel to the bed of the water, while, as a child would express it, the sea-horse swims standing up on its tail. The crested head is erect,—the action though stiff is graceful, not unlike the knightly steeds on the chess-board, very quaint yet comely.

I had through all those years desired to see the giving of the spawn by the female and the taking of it by the male; for, as shown in that article of 1867, the male Hippo is not only father but nurse to the young. In his front, just a little higher than the vent, is a sac, into which he receives the eggs of the female, and in which he hatches them. My desire was to see the method of taking the eggs into this pouch. Did he put them in or did she? Despairing now of ever seeing them in apposition, I must describe the act as I think it does take place.

I cannot believe that the twain are without emotion, since it is true of some of the higher fishes that the love-season calls out their intelligence to its highest manifestation. Suppose in our latitude it is July. A pair of these Hippocampi meet. They curl their prehensile tails about each other and assume an erect position, face to face. The female emits her eggs in a slow stream immediately over the pouch, which opens and closes at the top. The motion of the mouth of this sac is that of suction, thus the eggs are actually drawn into it. There they are patiently hatched and also nourished, as shown in the paper referred to. This apposition of the sexes, to be sure, is hypothesis, yet I think it will prove to be true. At any rate it is the outcome of long and patient thought, and is perfectly consistent with observation of habit.

When the young are ready for eviction, the pouch, which on receiving the eggs was fat and thick, has become flaccid and thin. Its adipose lining has been absorbed by the young fishes. So badly wasted is the pouch that muscular action sufficient to expel the brood is impossible. The father-fish evicts his charge in the following way. He gets himself in an erect position alongside of some object, a stick, stone, shell, or plant, either hooking the end of his tail under it, or in some way getting hold by its prehensile tip. Then stiffening the whole body and keeping it erect, he leans upon the object and brings himself down against it with a jerky movement; this rubs up the pouch, pushing out some of its occupants. This is done repeatedly until the whole brood is forced into the water.

Now, it is observable that an anal fin would be greatly in the way during such an operation. In fact, it would be a very bad obstruction. Hence the absence of this fin in the male Hippocampus. But it is present in my female, for in her case it is not in the way. In fact, it may be that she utilizes it at the time of emitting her spawn, as she could produce a gentle eddy of the water in the direction of the male's pouch.

I found by the microscope that diatoms were being generated in the tank, and I fancied that my pet was feeding on them, for in all my devices I did not succeed in feeding her myself. She would show a movement in her tubular snout which looked like sucking something in. Sometimes she would stretch herself on the bottom of the tank and apply the tip of her nozzle in a way that seemed to me like selecting by sight. And what a cunning look! as with sacerdotal steadfastness of purpose one eye was turned towards heaven and the other kept upon the earth. Certainly her food was microscopic, and in the hunt her optical application was binocular or monocular at will.

I noticed with some concern that the peculiar scales which covered its body, and looked not unlike plate armor, were becoming green. It proved that a growth of micrococci had set in, and was rapidly spreading over her. I was quite solicitous about it; for it would hardly do for me to clean it, so tender is the little creature. Its tank had become badly infested with these unicelled algæ. For the purpose of keeping up a supply of microscopic life for its food, besides the little two-gallon aquarium, I kept two specie jars going, and would transfer it to them, so that it could have freshness of food. Deciding to clean up the aquarium, I put it in one of the jars. It quite enjoyed the change, and to my surprise performed a series of movements on the clean sand, which turned out to be successful efforts to scour off the green parasitical slime. It needed patience, but that, with perseverance, did the work.

She was in a few days put back into her aquarium. The little handling necessary always begat a discernible clucking as of terror. It was really a species of snapping of the lips of the tubular snout. I heard it often, and under different circumstances, and thought I could detect three intonings,—one which was excited by terror, one denoting a pleasurable emotion, as when in play, and a third when quite still, perhaps faintly like the purring of another pet. But perhaps my intense sympathy with the little creature may give color to these interpretations.

Alas, there was now too much ground for sympathy,—a terrible malady had begun to take hold of the poor thing. The face took on a comical aspect. On each side rose a swelling as if she had the mumps. With a hand-lens I found that these were blisters, white vesicles, and so buoyant as to annoy her by producing eccentric movements. I contrived to pierce them with a needle, and so to let out the confined gas. This gave immediate relief. But they came again, and by and by my surgery did not avail. They increased, and the buoyancy would raise it to the surface, and the little sufferer despite all help would float. And so it was on the last day of February at an early hour I found poor Hippie afloat on her beam ends and dead. I had her alive just four months, and the above is but a tithe of what might be told of her pretty ways.

THE TACONIC QUESTION RESTATED.

BY T. STERRY HUNT.

§ 1. So much obscurity and misconception still exist in the minds of most geologists regarding what have been called the Taconic rocks, that it seems desirable to set forth clearly, and more concisely than has yet been done, the principal facts in the history of the two wholly distinct and very unlike groups of strata which have hitherto been included under this title, and which occupy very important places in American stratigraphy as well as in economic mineralogy. For a clear understanding of these strata, which, as originally described, lie between the crystalline schists of western New England and the continuous area of rocks belonging to the Ordovician (Chazy-Loraine) period, found along the Hudson and Champlain valleys, we must go back to the writings of Amos Eaton, in which we find, as early as 1832, a concise but complete exposition of the great stratigraphical problems presented by the region in question. The gneisses, with hornblendic and micaceous schists, of the Atlantic belt were then regarded by Eaton as the slaty or argillaceous member, constituting the lowest division, of his triple series of Primitive rocks; and were declared by him to be there followed by the second or silicious, and the third or calcareous member of the same series. These were the Granular Quartz-rock and the Granular Lime-